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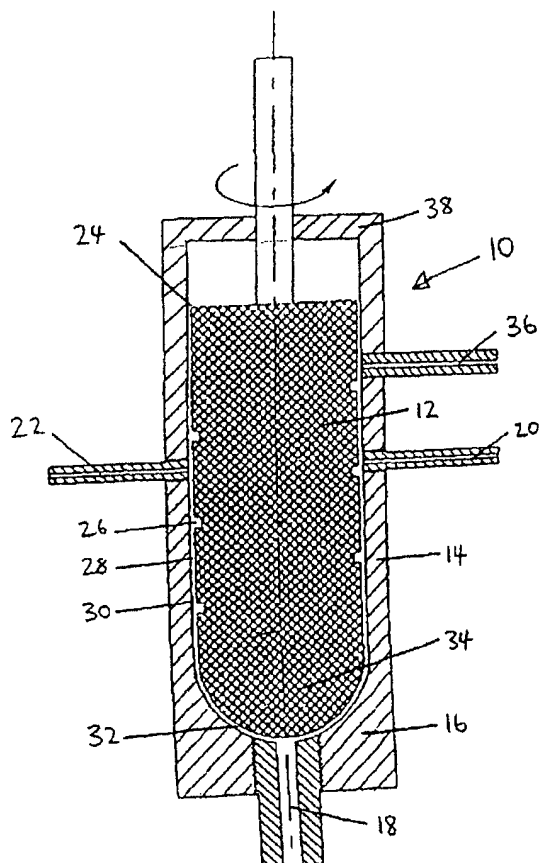
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(54) Title: **LIQUID PHASE REACTOR**



(57) Abstract: A liquid phase continuous reactor comprising a screw within a barrel, the screw and the barrel being relatively rotatable and defining a mixing zone therebetween, the barrel having at least one inlet for introduction of components for mixing into the barrel and an outlet for discharge of product from the barrel, the screw having at least one spiral groove whereby relative rotation of the screw and barrel is adapted to axially transport the components between the screw and the barrel while mixing the components and to extrude the product through the outlet, wherein the land surface area between the spiral groove forms at least 50 % of the surface area of the screw in the mixing zone.

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## LIQUID PHASE REACTOR

This invention relates to a liquid phase reactor. More specifically, the invention relates to a continuous flow reactor for liquid phase processing, for example to produce precursors for solid products and to mix multi-phase liquid systems. This invention also relates to a process for conducting liquid phase reactions in a reactor to produce, for example, precursors for solid products and to a process for mixing multi-phase liquid systems in a reactor.

Liquid phase processing such as wet chemistry processing can be performed in a reactor such as a batch reactor, continuous stirred tank reactor or plug flow reactor. Batch reactors allow reactants to react together in a vessel over a period of time. During the reaction, other reactants optionally may be added. The product formed is discharged at the end of the process. For batch reactors to be industrially useful they are often of large volume and consume large amounts of energy when high turbulent mixing is required.

Continuous stirred tank reactors operate continuously with out-flow being equal to total feed streams. Often the reactors are in series and, like batch reactors, are of a large total volume and require high turbulent mixing.

Plug flow reactors allow reactants to flow into the reactor without back-mixing. The rate of reaction is highest in the first part of the reactor where the concentrations of the reactants are highest. Plug flow reactors are more suitable for reactions of high reaction rates. However, the reactions can be difficult to follow and do not allow for compensation of times or conditions during production runs.

Extruders have been proposed for conducting reactions to produce plastics and other organic material. For example US Patent No. 5,266,256 describes a twin-screw extruder for the polymerisation of methyl methacrylate in which the residence time of the reactants in the extruder is increased.

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